SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, Marvin L. Williams, a citizen of the United States of America residing in the City of Hickory Creek, County of Denton, State of Texas, have invented new an useful improvements in a **METHOD AND SYSTEM FOR PROCESSING CORRELATED AUDIO-VIDEO SEGMENTS WITH DIGITAL SIGNATURES WITHIN A BROADCAST SYSTEM**

of which the following is a specification:

TECHNICAL FIELD OF THE INVENTION

The present invention relates to transmission and reception of broadcast signals and more particularly to a method and apparatus for correlating digital signatures to video frames and/or audio segments to create conditionally defined preferences. The invention is especially concerned with a method and apparatus for correlating the transmission of audio and video segments with a set of digital signatures over a wireless or non-wireless medium to allow for real-time substitution and processing of audio and video programs.

In one illustrative aspect, the invention concerns a mobile wireless receiver capturing digital signatures to create a set of listening and viewing preferences based on conditional preferences. In an alternative embodiment the invention uses a distributed computer network as the transmission medium. In this alternative embodiment the receiver is either a wireless or non-wireless computing device capturing the set of digital signatures to allow a user to define at least one conditional preference.

BACKGROUND OF INVENTION

In recent years the quality of commercial audio and video broadcasts has been eclipsed by the quality of stored digital information, such as compact discs (CDs), digital versatile disks (DVDs) and digital audio tapes (DATs). A number of systems have been developed for transmission and reception of digital audio and digital video signals. Prior art has generally focused on the fidelity and

quality of the sound delivered to compatible receivers. More recent methods have focused on the delivery of digitized audio within the FM band channel, In-Band On Channel (IBOC) as well as adjacent frequencies between In-Band Adjacent Channel (IBAC). In addition to delivering an analog source program in the form of digital representation these systems are known to deliver auxiliary data. An example of auxiliary data has included stock quotes, news, sports information, and subscriber specific information. Auxiliary data can be transmitted via traditional broadcast channels or on Subsidiary Communication Authorization (SCA) bands. For example, U.S. Patent 5,262,860 describes a method of capturing visually perceptible data from a video signal to perform automatic telephone dialing. Unfortunately, this method requires a visual perception of the data and does not address reception of the data based on conditional situations. Thus different techniques are known for transmitting data over subcarries in various broadcast systems. Despite these advances in the ability to receive and capture data within a broadcast system, these advances have not addressed real-time program substitution based on a user's preference to specific audio and video segments.

Users often encountered a problem of finding their listening and viewing preferences among a plurality of channels in existence. Recent scan and seek buttons have allowed users to search among a set of channels for a user preferred audio-video segment. An audio-video segment is defined as any logical or coherent group of audio segments and/or video frames, such as a song, movie, stock quote, talk show, etc. The audio-video segment is thus further defined to contain isochronous data, i.e., time based-streamed data, such as audio, video or animation. A digital signature is defined to be a self-descriptive informational construct that is non-isochronous in form.

Current seek and scan buttons do not guarantee a current playing of a user's listening and viewing preferences. Moreover, a user may discover a preferred broadcast program only after it has been partially completed; e.g. the song is half way over. More recent systems have allowed users to search a pre-defined database of broadcast programs and notify a user of upcoming programs. The pre-defined database approach is based on a publisher creating the pre-defined database and does not address the problem of replacing a currently playing broadcast program based on user preferences. Publisher created pre-defined databases have an inherent problem of forcing a user to access and search according to predefined characteristics and rules of the database publisher. In addition, a user's preferred listening and viewing preferences may not even be registered within the pre-defined database. Users desire the ability to define their own characteristics for finding a preferred viewing or listening preference.

Other prior art has the ability to preprogram channels, but lack the ability of automatically substituting a currently playing audio-video segment based on a users own constructed conditional expression. A conditional preference is defined as a conditional expression with an associated action. U.S. Patent 6,198,509, "Method and apparatus for providing and receiving broadcaster information", by Dougherty et al. addressed an interactive information system for storing broadcaster identifications associated with a channel, but failed to addressed the problem of defining and programming preferred viewing and listening characteristics based on conditional preferences. Moreover, U.S. patent 6,198,509 fails to address the problem of multiple audio-video segments in a single broadcast program of which only one audio-video segment or set of audio-video

segments are of interest to a user. This prior art and many others has inherently developed request-response approaches of interaction within the same transmission medium, e.g., an interactive cable TV provides information over cable and a user responds over cable. Users desire mechanism whereby they can get the information over cellular phones, Personal Digital Assistants, pagers and the like and have these devices control other reception and transmission mediums, such as radio, or television or the Internet based on their conditional preferences.

A viewing or listening preference may be of commercial or geographical nature, such as a sales promotion or directions to a location. Users often desire substitution of audio-video segments based on preferred geographical locations relative to their movement or their personal financial position. Under such conditions users desire the ability to respond or gather supplemental information based on a user's conditional preference. A method and apparatus that addresses these desires and other advantages will be further appreciated as the following detailed description and related drawings are read.

BRIEF DESCRIPTION OF DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a partially schematic block diagram of a broadcast system including Digital Correlator, Transmitter and Receiver

components of the present invention.

FIGURE 2 presents one embodiment of a block diagram of a digital signature used within the context of the present invention.

FIGURE 3 is a flow process diagram illustrating correlation and transmission of a set of digital signatures to an audio-video segment within the context of the present invention.

FIGURE 4 illustrates one embodiment of an electronic user interface for capturing digital signatures and creating conditional preferences in accordance to the principles of the present invention.

FIGURE 5 is a flow process diagram illustrating the method associating a captured digital signature to a conditional preference in accordance to the principles of the present invention.

FIGURES 6-7 are flow process diagrams illustrating the method of processing conditional preferences for substituting a currently playing audio-video segment within the context of the present invention.

FIGURES 8-9 are flow process diagrams illustrating the method of processing commercial, geographical and ancillary operations based on conditional preferences within the context of the present invention.

FIGURE 10 illustrates a block schematic diagram of an alternative embodiment of the present invention comprising a distributed computer network as the broadcast system with a first computer as the transmitter and a second computer as a receiver.

SUMMARY OF INVENTION

It is one object of the present invention to provide an improved broadcast system.

It is another object of the invention to provide an improved system and method to dynamically correlate digital signatures to an audio-video segment at non-conflicting intervals for output to a digital distributing device.

It is yet another object of the invention to provide an improved system and method associating a captured digital signature to a conditional preference.

It is yet another object of the invention to provide an improved system and method for selectively seeking and substituting preferred audio-video segments within a broadcast system for playing and recording.

It is yet another object of the invention to provide an improved system for capturing and processing electronic commerce information over a broadcast system.

It is yet another object of the invention to provide an improved system and method for capturing and interpolating global positioning satellite information with digital signatures over a broadcast system.

It is yet another object of the invention to provide an improved system and method for communicatively coupling conditional preferences correlated to audio-video segments between multiple devices.

DETAIL DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference now to the drawings and in particular with reference to FIGURE **1**, there is depicted a schematic pictorial representation in which like reference numerals indicate like parts of a system to implement the present invention. Included in FIGURE **1** are a Digital Correlator **150**, a transmitter **160** and a wireless receiver **100**. The wireless receiver **100** can be a mobile radio, a Personal Digital Assistant (PDA), a pager, a television or a cellular phone and the like. In the preferred embodiment, Digital Correlator **150** has digital and analog processing capabilities having at least one language decoder correlating the output of at least one digital signature to an audio-video segment duration of time. The audio-video segment duration of time is defined as a playing time for an audio-video segment. When multiple digital signatures and audio-video segments are involved for correlation, Digital Correlator **150** correlates multiple digital signatures to multiple audio-video segment duration of times.

A storage medium is transcribed with an electronic document **106** defining the correlation and sequencing of at least one digital signature to the audio-video segment duration of time for input into the language decoder. Preferably, Synchronized Multimedia Integration Language (SMIL) describes sequencing of a digital signature **200** having a correlated audio-video segment within electronic document **106**, however other languages and formats such as Extensible Mark-Up Language (XML), Standard Generalized Mark-Up Language (SGML), Wireless Mark-Up Language (WML), Hyper Text Mark-Up Language (HTML) and Compact Hyper Text Mark-UP Language (C-HTML) are applicable to the scope of the invention.

At least one language decoder decodes digital signature **200** and the audio-video segment from the storage medium containing electronic document **106** if present. In the preferred embodiment, the language decoder is an Extended Broadcast Language Decoder **110** component capable of processing electronic document **106** transcribed preferably in SMIL, however, XML, SGML, WML, HTML, C-HTML are applicable nomenclature for electronic document **106**.

Digital signature **200** specifies informational status data, logical conditional expressions and/or associated actions to be correlated with transmitted video frames and audio segments. This specification of digital signature **200** is called a Basic Operational Binary Byte Yield, herein referred as a BOBBY and is interchangeable used to identify a digital signature. In the preferred embodiment the content of a BOBBY is defined in an XML format.

If electronic document **106** is not present then Extended Broadcast Language Decoder **110** decodes digital signature **200** and a correlated audio-video segment from a disk **104**. After decoding at digital signature **200** and the correlated audio-video segment, Extended Broadcast Language Decoder **110** associates at least one digital signature transmission time with at least one audio-video segment duration of time. The digital signature transmission time is defined as an instance and duration of time for outputting a digital signature for the purposes of outputting a digital signature or data streaming digital signature **200**. In the preferred embodiment, Extended Broadcast Language Decoder **110** determines an elapsed number of seconds from the beginning of the audio-video segment to the end of the audio-video segment as the audio-video segment duration of

time to be used as input into a Synchronizer **108**. Synchronizer **108** receives timing information from a timing device to determine a non-conflicting transmission time for digital signature **200** within the audio-video segment duration of time. Synchronizer **108** has means for outputting digital signature **200** to a digital distributing device. Synchronizer **108** outputs digital signature **200** to Digital Encoder **112** within the audio-video segment duration of time. Synchronizer **108** receives at least one digital signature from at least one language decoder, preferably Extended Broadcast Language Decoder **110**. In the preferred embodiment the timing device is a clock **122** wherein Synchronizer **108** activates Audio/Video Output Device **114** for playing the audio-video segment and determines a remaining number of seconds from clock **122** to coincide the outputting of digital signature **200** to Digital Encoder **112** with the playing of the audio-video segment.

Alternatively, the audio-video segment duration of time can be derived from a start time and a stop time of the audio-video segment or from event notifications of start and stop of the audio-video segment without departing from the scope of the invention. In an alternative embodiment, the timing device is Audio/Video Output Device **114** sending a start signal to begin playing of the audio-video segment and a stop signal at the end of playing the audio-video segment to Synchronizer **108**. In this alternative embodiment Synchronizer **108** outputs digital signature **200** to Digital Encoder **112** to coincide between the start signal and the stop signal.

Moreover, Synchronizer **108** correlates a set of digital signatures as identified within electronic document **106** or formatted on disk **104** to be outputted at non-conflicting transmission times

during the playing of the audio-video segment. Synchronizer **108** determines a non-conflicting digital transmission time for each digital signature within a set of digital signatures. A non-conflicting digital signature transmission time is defined as period of time that does not conflict with any other digital signature transmission time. Given modern day components and processing capabilities these non-conflicting digital signature transmission times may exist for seconds or milliseconds while playing the audio-video segment. Synchronizer **108** outputs each digital signature into Digital Encoder **112** by identifying an available time slot for each digital signature within the audio-video segment duration of time. Synchronizer **108** sends each digital signature at the non-conflicting digital transmission time. The set of digital signatures may contain members that are identical, i.e., a single digital signature being continuously sent to Digital Encoder **112** while Audio/Video Output Device **114** plays the audio-video segment. Synchronizer **108** ensures no interference or cross stepping between digital signatures being transmitted during the audio-video segment duration of time. Synchronizer **108** dynamically synchronizes and correlates multiple digital signatures to the audio-video segment at non-conflicting intervals of time while transmitting, playing, recording, or data streaming the audio-video segment.

In another embodiment of the invention, the language decoder is a Transmission Specific Signature Syntax Builder (TSSSB) **120** capable of dynamically processing a real-time broadcast digital signature. The real-time broadcast digital signature is defined as a digital signature generated and introduced during the actual transmitting, playing, recording or data streaming of the audio-video segment. The

real-time broadcast digital signature can include station identifier, time that the audio-video segment will be transmitted again, commercial information, transmission frequency, alternate Internet address, musical category of a station and the like. Preferably the real-time broadcast digital signature is transmission specific data correlated to a currently playing audio-video segment although this need not be the case. In the preferred embodiment, TSSSB **120** dynamically outputs the real-time broadcast digital signature into Synchronizer **108** to determine a non-conflicting transmission time for the real-time broadcast digital signature during the audio-video segment duration of time. TSSSB **120** is comprised of a Graphical User Interface allowing users to dynamical associate real-time broadcast digital signatures with the currently playing audio-video segment. A serial interface from TSSSB **120** outputs at least one real-time broadcast digital signature into Synchronizer **108**. Alternatively, TSSSB **120** outputs a plurality of real-time broadcast digital signatures. Parallel and other digital interfaces are also applicable as a replacement for the serial interface component. TSSSB **120** formats and sends the real-time broadcast digital signature through the serial interface for processing by Synchronizer **108**. Synchronizer **108** again ensures no interference or cross stepping on the transmitting, playing, recording, or data streaming between any digital signatures. For example, a broadcaster may wish to advertise that a currently playing song on disk **104** may be purchased at a specific store. Synchronizer **108** synchronizes and correlates an advertiser specific digital signature for the song during transmission without conflicting with other transmitting digital signatures.

Synchronizer **108** activates Audio/Video Output Device **114**. Additionally, real time audio and video may be generated from Audio/Video Output Device **114** such as through a microphone (not shown). Audio/Video Output Device **114** outputs an analog signal to transmitter **160**. In the preferred embodiment, transmitter **160**, contains analog and digital processing capabilities and functions as an analog input device and as a digital distributing device for transmitting on a transmission medium at least one transmission instance of a digital signature correlated to at least one audio-video segment. Transmitter **160** comprises an Analog Signal Generator **118** receiving the analog signal from Audio/Video Output Device **114**. Digital Encoder **112** encodes digital signature **200** outputted from Synchronizer **108** as a digital signal for output to the digital distributing device within the audio-video segment duration of time. In the illustrative embodiment the digital distributing device is transmitter **160** comprising of a Digital Signal Generator **116**. Transmission of the digital and analog signals can occur through a wireless or non-wireless medium.

The invention executes a novel feature of dynamically adding personal or system generated digital signatures in a non-conflicting manner to pre-existing digital signatures having the correlated audio-video segment for output to a digital distributing device.

Alternate digital distributing devices include a CD-ReWritable device, a stand-alone computer, a distributed network computer, a MP3 player, a DVD player/recorder, a videocassette recorder or a digital cam-recorder. For example, a user may desire to add personal editorial digital signatures correlated to an audio-video segment, thus using output from Digital Correlator **150** to write a CD. In the

preferred embodiment, Digital Encoder **112** supports data in a Program Associated Data (PAD) format including support of Fixed-PAD (F-PAD) and extended transport formats, such as Mixed Object Data (MOD) for broadcasting by transmitter **160**. Alternative embodiments include the transmission and reception over the transmission medium wherein the transmission medium is a television broadcast band, a cable broadcast band, a digital satellite signal, a distributed computer network, and a Wireless Application Protocol (WAP) medium.

Digital Signal Generator **116** performs digital baseband processing, forward error correction signal coding, modulation and related digital signal processing functions for transmitting the digital signal. Analog Signal Generator **118** within transmitter **160** processes the analog signal from Audio/Video Output Device **114**. The analog signal from the Analog Signal Generator **118** and the digital signal from Digital Signal Generator **116** are summed together in a Summer **124** to form a composite modulated signal. In the preferred embodiment, Summer **124** has a Coded-Orthogonal-Frequency-Division-Mulitplexer (COFDM) encoder and modulator that combines the analog and digital signals. Summer **124** functions as a modulator or exciter, performing as a local oscillator, upconverter, signal formatter and linear amplifier, for the combined analog and digital signals.

Transmitter **160** broadcasts both an analog frequency transcribed with a transmission instance of digital signature **200** having a correlated audio-video segment. The analog signal may be modulated via frequency, FM, amplitude, AM, or a plurality of frequency degradation means including the following modulation means: Amplitude-Shift Keying (ASK), Frequency-Shift Keying (FSK), Phase-

Shift Keying (PSK), Quadrature-Amplitude Modulation (QAM), and Differential Phase-Shift Keying (DPSK). Transmission standard Eureka 147 and the like are applicable transmission formats for the invention. Preferable, when used for broadcast to automobiles and the like, the digital signal and the analog modulated signal correspond in their content when demodulated by receiver **100** for listening or viewing by a user, although this need not be the case. The summed radio frequency (RF) from Summer **124** transmits a composite modulated/digital signal via an omnidirectional antenna **126**. A conventional analog modulated receiver, a digital signal receiver, or a combination thereof may receive the composite modulated/digital signal. In one alternative embodiment transmitter **160** still transmits the analog signal, however Synchronizer **108** outputs the transmission instance of digital signature **200** on a differing transmission medium from the analog signal. In this alternative embodiment, the transmission instance of digital signature **200** contains a reference to the frequency or medium associated to the audio-video segment of the broadcast program. In this alternative embodiment the invention executes the novel feature of having Synchronizer **108** output to a digital distributing device that utilizes a different transmission medium then the audio-video segment.

A wireless receiver **100** having equipment for receiving and detecting at least one transmission instance of digital signature **200** having the correlated audio-video segment processes the transmission instance of digital signature **200** by a central processing unit (CPU) **140** with programmable stored instructions. It should be noted that

the transmission instance of digital signature **200** might be a first instance of transmission or a subsequent instance of transmission for digital signature **200**. Wireless receiver **100** receives the composite modulated/digital signal from a radio frequency (RF) carrier via a receiving omnidirectional antenna **102** the composite modulated/digital signal is divided into two paths by way of a splitter **168**. Splitter **168** separates the reception of the digital signal summed with the analog signal, preferably as summed by transmitter **160**. An Analog Signal Demodulator **158** interprets the composite modulated/digital signal and sends it to an audio-video output line **170** for audio and/or video reception. The digital signal from splitter **168** is directed toward Digital Signal Processor (DSP) demodulator **162** performing digital base band processing, forward error correction signal coding, modulation and related digital signal processing functions. DSP demodulator **162** outputs the digital signal to a digital output line **172**, such as a digital audio and/or digital video and to a Digital BOBBY Decoder **154**. Upon Digital BOBBY Decoder **154** detecting and decoding the transmission instance of digital signature **200**. Digital BOBBY Decoder **154** sends the transmission instance of digital signature **200** over a data bus **174** to a programmable central processing unit **140**, and to an onboard cache memory **146** and to a display unit **144**. Display unit **144** receiving the transmission instance of digital signature **200** displays a textual description associated to the transmission instance of digital signature **200**. The transmission instance of digital signature **200** is designated as a currently active digital signature with a currently playing audio-video segment.

Central processing unit **140** determines if the digital transmission instance has at least one conditional preference comprised of at least one conditional expression and an associated action. If the conditional expression evaluates to a true state then central processing unit **140** automatically initiates execution of the associated action.

Another novel feature of receiver **100** is permitting a user to define the captured digital signature with an associated interrupt-priority value. An electronic user interface **400** comprising a function control using keypad control unit **148** for associating at least a first captured digital signature from the currently active digital signature to at least one conditional preference. The invention provides a default conditional preference wherein central processing unit **140** with programmable stored instructions processes the default conditional preference by seeking a correlated audio-video segment having a higher interrupt-priority value than the interrupt priority value associated with the currently active video-segment and automatically substituting the currently playing audio-video segment with the correlated audio-video segment having the higher interrupt-priority value.

The default conditional preference comprises of the captured digital signature having an associated interrupt-priority value for subsequently seeking a frequency or Internet address referenced by a subsequent transmission instance of a digital signature having an higher interrupt-priority value than the interrupt-priority value correlated to the currently playing audio-video segment, i.e., the currently active digital signature. Upon finding a frequency and/or Internet address referenced by the subsequent transmission instance

of digital signature **200** containing a higher interrupt-priority value, receiver **100** automatically selects the frequency or Internet address referenced by the subsequent transmission instance of digital signature **200** and substitutes the currently playing audio-video segment with the audio-video segment referenced by the subsequent transmission instance of digital signature **200**.

In one conditional preference, a scanner **152** scans a plurality of frequencies seeking an adequate strength signal that contains a subsequent instance of the transmitted instance of digital signature **200** with the higher interrupt-priority value than the currently active digital signature. Upon scanner **152** detecting a subsequent transmitted instance of a digital signature having an higher interrupt-priority than the currently active digital signature, i.e. the currently playing audio-video segment, scanner **152** adjusts a tuner **164** for playing the audio-video segment associated to the subsequent transmitted instance of the captured transmitted instance of digital signature **200** via display unit **144** and speaker unit (not shown). Alternatively, IrDA Sending/Receiving Unit **132** sends out an appropriate infrared pulse signal code to adjust an external tuner (not shown) for an infrared equipped device **138**. If the associate action of the conditional preference is receiver specific then wireless receiver **100** through its associated interfaces, including a Global Positioning Satellite (GPS) interface unit **128**, an Integrated Circuit Card (ICC) interface unit **130** and an IrDA Sending/Receiving unit **132**, performs specific receiver actions upon the conditional expression within the conditional preference evaluating to a logically true state.

The first captured digital signature and associated conditional preference can be derived from a capture of a broadcast transmission, as previously described or by manually entering the first captured instance of the conditional preference using keypad control unit **148**. In addition, the conditional preference can be received through an Integrated Circuit (IC) Card **136**, commonly known as a smart card or through infrared equipped device **138** or combination thereof.

Receiver **100** may receive a broadcast program with an audio-video segment having at least one transmission instance of digital signature **200** specifying geographical coordinates. For example, the geographical coordinates could convey retail store locations selling the currently playing audio-video segment. Central processing unit **140** evaluates conditional preferences having geographical base parameters within the conditional expression of the conditional preference. If the conditional preference having geographical evaluates to a true state then a GPS interface unit **128** reads GPS information from GPS receiver **134**. This provides receiver **100** with means for interpolating geographical information from GPS interface unit **128** and geographical coordinates identified by the currently active digital signature and displaying geographical locations within electronic user interface **400**. Preferably, GPS interface unit **128** receives and decodes GPS information in a National Marine Electronics Association (NMEA) format. NMEA 2000 specifically, although other formats and protocols are permissible without departing from the scope of the invention. GPS information received from GPS receiver **134** is sent to GPS interface unit **128** and sent over a data bus **174** to Central processing unit **140**. Central processing unit **140** evaluates

the conditional expression for interpolating geographical information from GPS interface unit **128** and the currently active digital signature containing geographical coordinates for displaying geographical locations and directions within electronic user interface **400**. For example, the conditional preference may contain a complex logical expression such as notify a user with directions when the user is within a 2 mile radius of a store that contains a CD of a currently playing song. The geographical coordinates identified by digital signature **200** is decoded by Digital BOBBY Decoder **154** and displayed along with a user's current location as inferred by geographical information received from GPS interface unit **128**. Keypad control unit **148** provides a function control to activate central processing unit **140** to store GPS information, directions and a graphical representation for subsequent viewing on an external display unit (not shown) using a non-volatile memory **142** as a storage medium.

Central processing unit **140** resolves the conditional preference in determining at least one associated action to be performed upon the conditional preference resolving to a logically true state. Central processing unit **140** resolves a time-based conditional preference by accessing a timing clock **156** to determine the current date and time. Central processing unit **140** resolves a conditional preference having geographical conditions by accessing the GPS interface unit **128** to determine current geographical location as delivered from GPS receiver **134**. A conditional preference that resolves to display information is shown via display unit **144**. A conditional preference resolving to play audio information can be

heard via a speaker (not shown). Optionally, display unit **144** transfers information to be displayed and/or heard directly using an external device, (not shown) through audio-video output lines **170** and **172**. This permits associated information to be displayed through the analog and digital systems as outputted on output lines **170** and **172**.

A significant aspect of the invention is IrDA Sending/Receiving Unit **132** has infrared pulse length modulation capabilities for communicatively coupling receiver **100** to infrared equipped device **138**, such as a television, a stereo-receiver, computer, radio and the like. Central processing unit **140** evaluating the conditional preference wherein the associate action of the conditional preference is to communicatively couple receiver **100** to infrared equipped device **138**. Central processing unit **140** executes instructions to transmit at least one infrared command. Preferably, infrared commands from IrDA Sending/Receiving Unit **132** are encoded in RC5 and REC80 international standard codes. This significant aspect of the invention permits the action associated with a conditional preference to manipulate a plurality of infrared equipped devices. For example, upon receiver **100** receiving a digital signature activating a conditional expression to a logically true state receiver **100** substitutes a currently playing audio-video segment on an external infrared equipped television or radio, i.e. infrared equipped device **138**.

Alternative embodiments include, upon the currently active digital signature being captured, a playable portion of the correlated audio-video segment is stored in non-volatile memory **142** for reference purposes. Other alternative embodiments include associating multiple conditional preferences to a single captured

digital signature, associating a plurality of captured digital signatures to a single conditional preference as well as deriving the currently playing audio segment and associated interrupt priority value from an internal playing component **176**.

Using internal playing component **176** to play the currently playing audio-video segment, DSP demodulator **162** demodulates the transmission instance for the currently active digital signature from internal playing component **176**. Internal playing component **176** can be a disk player such as a CD-player or DVD player, as well as DAT player, cassette tape player, MP3 player and the like. Internal playing component **176** plays the currently playing audio-video segment having an associated interrupt-priority value. The currently playing audio-video segment is designated as the currently active digital signature having the associated interrupt priority value. As previously described, Digital Correlator **150** permitted for CD, DVD, computer disks, MP3 files, cassette tapes and the like to associate a digital signature to an audio-video segment having a corresponding interrupt-priority value. For example, a user may be listening to a song (an audio-video segment) on a CD with the associated interrupt-priority value recorded using Digital Correlator **150** while scanner **152** would be seeking a song having a higher interrupt priority value on other frequencies and Internet addresses.

Another alternative embodiment of the invention is the conditional preference is transferred bi-directionally between wireless receiver **100** and IC Card **136** (smart card). Additionally, the conditional preference is transferred bi-directionally between wireless receiver **100** and infrared equipped device **138**. The conditional preference is stored in non-volatile memory **142** and sent

over data bus **174** where ICC interface unit **130** using an EPROM connection encodes the conditional preference for transference to IC Card **136**. Preferably information is exchanged with ICC interface unit **130** via a JAVA Card Application Programming Interface protocol that is ISO 7816-4 compliant, although alternate protocols are applicable without departing from the scope of the invention. Additionally, IrDA Sending/Receiving Unit **132** is communicatively coupled to infrared equipped device **138** to send at least one conditional preference to infrared equipped device **138** and receive the conditional preference from infrared equipped device **138**. Conditional preferences from infrared equipped devices are transferred bi-directionally with Infrared Sending/Receiving Unit **132** preferably using an Infrared Data Association (**IrDA**) protocol. The conditional preference and a correlated audio-video segment reference in infrared equipped device **138** is transcribed over IrDA Sending/Receiving Unit **132** to central processing unit **140** and is stored in non-volatile memory **142**. Those skilled in the art recognized that a plurality of infrared data transfer protocols and formats exist and could be incorporated by the invention without departing from the spirit and scope herewith.

Another alterative embodiment includes scanner **152** scanning specific channels or Internet addresses as identified in IC Card **136** or in onboard cache memory **146**. Scanner **152** alternatively functions as an Internet connection socket to scan, receive and detect information over the Internet. An Internet Interface component (not shown), wireless or non-wireless, such as a Network Interface card or WAP compliant circuit component permits the invention to receive information from a distributed network to Digital Bobby Decoder **154**

as described when the transmission medium is a distributed network.

In still another alternative embodiment, the storage medium is disk **104** defining correlation of digital signature **200** to audio-video segment and the audio-video segment duration of time. The preferred disk format for defining the correlation is a CD-ROM Mix Mode format. Additionally, CD-ROM XA, DVD-ROM, DVD-RAM, CD-I, CD-DA, CD-ReWritable, magnetic tape and other digital storage formats are applicable to the invention and provide means for storing and correlating a set of digital signatures to multiple audio-video segments without departing from the scope of the invention. Moreover, electronic document **106** may exist on the same or separate storage medium as the audio-video segment(s). For example, the audio-video segment may be stored on disk **104** while a correlated digital signature is identified within electronic document **106** is on a separate storage medium.

While several specific embodiments of the principles of the present invention are illustrated in the accompanying drawings and described in detail in the above specifications, it is to be understood that changes may be made without departing from the scope and spirit of the present invention. The scope of the present invention is not limited to specific frequency bands and carrier frequencies or transmission mediums set forth above. Also it is to be understood that the present invention is not limited to the particular semiconductor circuits used in the preferred embodiment. Integrated circuits such as described in the above specification or discrete components can be used to perform various functions in the block diagrams. These and other modifications may be made by one of ordinary skill in the art without departing from the principles of

the present invention.

Turning now to FIGURE **2** is a block diagram illustrating a digital signature **200** referred to as a BOBBY. Digital signature **200** exists in two basic formats. One format is an informational format used to convey information about the audio-video segment of a broadcast program, but the information need not be related to the broadcast program. A second format is a conditional preference format that describes at least one conditional expression associated to at least one action upon the conditional expression resolving to a logically true state. Although these formats are illustrated in the self-describing data object form in FIGURE **2**, they are preferably represented in an XML nomenclature when conveyed within a text document (not shown). Digital signature **200** illustrates a basic informational construct for a digital signature having a Type field **204** defining the type of BOBBY being conveyed, either informational or conditional preference format. Preferable informational format is used during transmission from transmitter **160** and the conditional preference format used upon capture of an informational formatted digital signature, although conditional formats may be also be transmitted within the context of the invention.

Length field **206** describes the length of the BOBBY in hexadecimal notation, not including a checksum. Expression Field **208** contains an expression descriptor that identifies the content of the information or conditional expression for the conditional preference. A detail break out of the expression field **208** is shown in expression descriptor **210**. Length field **212** contains the type and length of the conditional expression. Attribute field **230** describes attribute information on related to the audio-video segment.

Attribute information can be on information directly related or not to a correlated audio-video segment of the broadcast program. Each attribute is identified by a unique hexadecimal value. The attribute field is identified within the transmission instance of digital signature **200** being transmitted by transmitter **160**, thus identifying digital signature **200** with the attribute.

Attributes specified include: Audio Song Identifier **226** to uniquely identify a song correlated to the audio-video segment. Song Title **228** identifies the title of the song to the correlated audio-video segment. Artist **232** identifies the artist of the correlated audio-video segment. Date of Song **234** identifies a date of creation or original publication of the correlated audio-video segment. Movie title **236** identifies the title of a movie of the correlated audio-video segment. Cast **238** identifies a set of cast members of the correlated audio-video segment. Director of Movie **242** identifies a set of directors of the correlated audio-video segment. Credits field **244** identifies credits of the correlated audio-video segment. Date of Movie **246** identifies a date of a movie of the correlated audio-video segment. Public Key for Play **248** identifies a public key when used with a private key permits decoding of specific isochronous and/or digital signature information for the correlated audio-video segment. Channel to Play **252** identifies a channel transmitting the correlated audio-video segment. Morality of Play **254** identifies a moral content nature and recommendation, such as PG-13, to the correlated audio-video segment. Time left to Play **256** identifies number of seconds remaining for completion of the correlated audio-video segment. UTC for Play **258** identifies a Coordinate Universal Time for start time

and date of the correlated audio-video segment. UTC for Completion **262** identifies a Coordinated Universal Time at which the correlated audio-video segment will finish. Character Code Set **266** identifies a character code set of fields within digital signature **200**. Copyright Information **268** identifies copyright date and rights information for the correlated audio-video segment. Summary **272** identifies an abstract summary associated to the correlated audio-video segment. Critic Identifier **274** identifies a set of critics for the correlated audio-video segment. Critic rating **276** identifies a 5 star ranking value given by a critic as identified within the Critic Identifier **274** field associated to the correlated audio-video segment. Commercial Identifier **278** uniquely identifies a commercial for the correlated audio-video segment. Product Code **282** identifies a specific product having a universal bar code for the correlated audio-video segment. Category field **284** identifies a category for the correlated audio-video segment, such as jazz, country, polka, rock, and rap. Product Description **288** identifies a text description of a specified product for the correlated audio-video segment. Product Price **286** identifies a price of a specified product correlated to the audio-video segment.

End of Broadcast **292** identifies a flag to designate the end of the correlated audio-video segment. Price to Play **294** identifies a monetary price to play or access the correlated audio-video segment. Length of Segment **296** identifies a length in seconds of the correlated audio-video segment. URL **298** identifies at least one Universal Resource Locator for the correlated audio-video segment that permits manual or automatic navigation within a distributed

network, such as the Internet. As previously described, Synchronizer **108** can alternatively output to a distributed network. URL **298** permits identification of a network address for data streaming. An Interrupt-priority field **299** identifies an ordinal value of preference for interrupting a currently playing audio-video segment. A user upon viewing or hearing the audio-video segment specifies the ordinal value or a default interrupt-priority value is automatically assigned upon the user requesting to capture a transmission instance of digital signature **200**. A Coupon field **297** identifies electronic coupon and discount information associated with Product Code **282** of the correlated audio-video segment. The Coupon field allows a commercial entity to identify digital signatures as coupons for physical or electronic purchases. The invention allows a user to capture coupons for subsequent use via hearing or seeing the correlated audio-video segment of the broadcast program. Movie Identifier field **293** uniquely identifies a movie for the correlated audio-video segment. Global Positioning Satellite field **295** identifies geographical coordinates associated to the correlated audio-video segment. Alternatively, geographical coordinates are specified by Mobile Positioning Center (MPC) protocol, using a triangulation of at least three communication cells. Alternatively Global Positioning Satellite field **295** identifies a plurality of geographical coordinates associated to multiple locations. This information includes longitude, latitude, and altitude and optionally vectors describing a relative velocity.

A Value field **250** identifies an associated value for the attribute field **230**. Value field **250** is identified by a unique hexadecimal number, followed by the length of the field, followed by

a content descriptor. The content descriptor is alphanumeric in nature. A unique hexadecimal value in the Type portion of the Value field **250** identifies the alphanumeric type for the content descriptor. The length field describes the length in bytes of the content within Value field **250**. A purely informational digital signature merely conveys fields **212, 230** and **250** within the expression field **208**.

As previously described digital signature **200** may contain a conditional expression, in such cases, a Conditional field **225** is conveyed along with Attribute field **230**. The Conditional field **225** identifies types of conditions for initiating a specified action. Condition field **225** identifies itself and a type of logical condition. Types of logical conditions included and illustrated in FIGURE **2** are: While **214** to allow for continuous actions while the conditional expression is true. Play conditional field **216** specifies a direct action to play the correlated audio-video segment unless specified with another condition, such as Until field **218**. Until field **218** specifies continuous operation of an action until the specified conditional expression is resolved to a logically true state. A Conditional-If field **222** identifies an action to perform if the expression is true. A Conditional DO field **224** defines an action to be executed. A Conditional Scan **220** identifies a set of channels to scan while the expression is true. Alternatively, when the invention uses a distributed computer network medium, Conditional Scan **220** defines a set of URLs to Scan. The set of URLs are specified in Value field **250**. A hexadecimal value greater than the frequency channel indicates to scan all channels while the condition is true.

Operator field **240** identifies an operational condition to evaluate the conditional expression. Operational conditions include: Equal **205,** to evaluate if Attribute field **230** is equal to the value contained within the content of Value field **250.** Not Equal **221** field evaluates if Attribute field **230** is not equal to the content in Value field **250.** Greater Then field **231** evaluates if Attribute field **230** is greater than the value within the content in Value field **250.** Less Than field **241** evaluates if Attribute field **230** is less than the value in the content of Value field **250.** Greater Then or Equal **251** operator field evaluates if Attribute field **230** is greater than or equal to the content in Value field **250.** Less Then or Equal **261** operator field evaluates if Attribute field **230** is less then or equal to the content in the Value field **250.** A Contains **281** operator field evaluates if a specific value as defined within the content of the Value field **250** is contained within a set of digital signatures being received by receiver **100.**

The Action field **270** identifies the associated action that is to be performed if the conditional expression is evaluated as true. When Action field **270** is combined within digital signature **200** with the expression descriptor **210** the BOBBY forms a conditional preference. Associated actions include but are not limited to:

Play Action **203,** specifies to play the correlated audio-video segment. The audio-video segment could be played on internal playing component **176** or played on infrared equipped device **138** via IrDA Sending/Receiving Unit **138** sending appropriate infrared signal codes. The infrared equipped device can be a CD/DVD player/recorder, a cassette player, television or any other infrared equipped device. It

should be noted that the Send Action **213** specifies to send information to a specific device, which is identified in the Value field **250**. Purchase action **223** to purchase a specified item as contained within digital signature **200** or retrieved from non-volatile memory **142**. The Alert field **233** specifies to alert a user when the expression is true. Alerts are be performed by audio or video using display unit **144** of FIGURE **1**. The Find action **243** specifies a directional mapping of a geographical location as received from receiver **100** within the currently active digital signature. Central processing unit **140** processes geographical information within digital signature **200** and marks a designated location in a map displayed on display unit **144**. A Direct action **253** field initiates an action to display unit **144** to draw and converse directions from a designated location using GPS information derived from GPS unit interface **128** as delivered by GPS receiver **134**. An Adjust field **263** specifies adjustments to equipment attributes as specified in the Value field **250**. For example, the Adjust field **263** can adjust volume or bass for display unit **144** and output units **170** and **172**. The Mute action field **273** specifies to mute the device as specified in the value field **250**. The Receive action field **283** identifies ancillary specific operations for wireless receiver **100**. The Switch action field **293** specifies to switch channels, frequencies, or Internet addresses upon the conditional expression resolving to a logically true state. The Scan Action field **271** specifies to execute a command to scan specific channels, frequencies or Internet addresses as specified in the Value field **250** upon conditional expression being true. It should be stated that a conditional preference default the conditional

expression to a logically true state when a conditional preference only has an associated action. Thus it is permissible to state the action and value for immediate execution of the specified action.

A novel feature of the invention is digital signature **200** specification of electronic commerce information, specifically attributes: Commercial Identifier **278**, Product Code **282**, Product Description, **288**, Price to Play **294**, Product Price **286** and Coupon field **297**. These attributes thus define electronic commerce information for the correlated audio-video segment for transmitter **160** to transmit and for receiver **100** to capture and construct conditional preferences based on a financial condition. The financial condition can be further assessed from information retrieved from IC Card **136** (smart card) via interface ICC interface unit **130**.

Modifications of these self-descriptive informational constructs and additional fields with differing logical constructs and combinations may be made by one of ordinary skill in the art without departing from the principles of the present invention.

Turning now to FIGURE **3**, illustrated is a flow process diagram for correlating and transmitting a set of digital signatures to an audio-video segment during a broadcast program. The process starts at step **300** where initialization occurs for Digital Correlator **150**. After initialization step **305**, Extended Broadcast Language Decoder **110** decodes a correlation for the output of at least one digital signature to the playing of at least one audio-video segment. Extended Broadcast Language Decoder **110** reads a digital signature from disk **104** for processing in step **310**. In the case of no electronic document **106**, step **305** is a null process. After reading

digital signature **200**, step **315** evaluates the priority value of digital signature **200**. It is important to note that the priority values being defined in process steps **315** and **325** are for prioritizing insertion and/or transmission of digital signatures and are not interrupt-priority values for interrupting a currently playing audio-video segment. Next step **320** reads total elapse time for the audio-video segment as specified in electronic document **106** or from disk **104** if electronic document **106** is not present. The elapse time is loaded into Time Left to Play field **256** of digital signature **200** and processed by Synchronizer **108** and is designated as an audio-video segment duration of time. Synchronizer **108** in step **325** loads a default priority value into digital signature **200** if no priority is specified for digital signature **200**. Next decisional step **330** determines if digital signature **200** (BOBBY) is to be transmitted repeatedly while playing an audio-video segment. If digital signature **200** is scheduled for continuously to be outputted then step **340** determines a non-conflicting digital signature transmission time for repeatedly transmitting digital signature **200** (BOBBY) within the audio-video segment duration of time. Process step **340** determines a plurality of non-conflicting transmission times for continuously repeating transmission of digital signature **200** (BOBBY) while not conflicting with the transmission time of other digital signatures during the audio-video segment duration of time. Transmission times are compared in step **340** to ensure no cross stepping while repeatedly transmitting the set of digital signatures within the audio-video segment duration of time. After step **340** the process continues to step **335** where a non-conflicting transmission time is assigned to

digital signature **200** (BOBBY). If there are no continuous digital signatures as determined from step **330** then the process continues once again to step **335** where non-conflicting transmission times for the set of digital signatures within the context of the audio-video segment are loaded into Synchronizer **108**. Next decisional step **345** reads information from TSSSB **120** to determine if at least one real-time broadcast digital signature to be transmitted (outputted) during the audio-video segment, i.e., within the audio-video segment duration of time. If there is at least one real-time broadcast digital signature then the process continues to step **350** where Synchronizer **108** determines a non-conflicting transmission time for the real-time broadcast digital signature during the audio-video segment duration of time. After assignment of transmission times from step **350** the process continues to step **355** where priority values are resolved for digital signatures having conflicting transmission times, if there are conflicting transmission times. Priority values, and number of transmissions, first-in-first-out methodologies, can be used to assign non-conflicting transmission times. After assigning non-conflicting transmission times the process continues to step **360**. If no transmission specific data is to be broadcast then the process continues from decisional step **345** to step **360** where Audio/Video Output Device **114** begins playing the audio-video segment. Process step **360** activates Audio/Video Output Device **114**. The preferred playing device is that of a DVD player/recorder with Universal Serial Bus (USB) interface. Alternatively, Audio/Video Output Device **114** is a CD-ROM player, a CD-ReWriteable player, a MPEG enabled multimedia computer, a videocassette player, a MP3 player, a cassette player and

the like. After playing has begun, decisional step **365** determines if the audio-video segment is at the end of a playing sequence. If the audio-video segment is done playing, i.e., at the end of the audio-video segment duration of time, then the process continues to termination step **399** where the process is stopped. If decisional step **365** determines the audio-video segment is still playing then the process continues to step **370** where Synchronizer **108** gets the current time from clock **122**. Next decisional step **375** determines if digital signature **200** is scheduled for output to a digital distributing device, preferably transmitter **160**. If digital signature **200** is scheduled for output then the process continues again to decisional step **365**. If digital signature **200** (BOBBY) is scheduled for output then decisional step **380** determines if digital signature **200** (BOBBY) conflicts with any dynamically generated real-time broadcast digital signatures, i.e. two BOBBYs scheduled for the same time of transmission or having an overlap time. If a transmission time conflict exist between digital signatures, then the process continues to step **385** where a digital signature with the Lower priority is moved to a next available time slot for transmission. In the case of a tie, the preferred embodiment is a first-in-first-out methodology to resolve ties. Pluralities of methodologies exist for resolving ties which does not depart from the scope and spirit of the invention. After resolving conflicts in step **385** the process continues to step **390**. If there are no conflicts as determined in decisional step **380**, then the process again continues to step **390** where digital signature **200** is encoded for output. After being encoded, the process continues to step **395** where digital signature

200 is outputted to a digital distributing device, preferably transmitter 160. It should be noted that Analog Signal Generator 118 generates the analog signal associated with the audio-video segment concurrently with step 395. Alternatively, the audio-video segment generated by Analog Signal Generator 118 can be generated digitally using Digital Signal Generator 116. The process continues once again to decisional step 365 where again a determination is made on if the audio-video segment is finished playing. As previously described, if the audio-video segment is finished playing the process continues to termination step 399 where the process stops.

Turning now to FIGURE 4, illustrated is a block diagram of one embodiment of an electronic user interface for capturing digital signatures and creating conditional preferences in accordance to the principles of the present invention. An electronic user interface 400 for receiver 100 receives transmitted instances of digital signatures and audio-video segments.

Electronic user interface 400 comprises a display unit 144 and a Capture button 430 for capturing a currently received digital signature from within onboard cache memory 146. In the preferred embodiment a transmission instance of digital signature 200 is retrieved from onboard cache memory 146. A textual description 405 of digital signature 200 is displayed in display unit 144. Also electronic user interface 400 provides means for displaying a list of previously captured digital signatures using a LIST button 440 in display unit 144. Electronic user interface 440 also provides means for designating a currently active digital signature from the list of previously captured digital signatures using List Button 440.

To receive digital signatures from infrared equipped device **138**, wherein the infrared equipped device **138** is functioning as an infrared transmitter, electronic user interface **400** comprises IrDA Receiver/Sending Unit **132** as described in FIGURE **1** and shown pictorially in FIGURE **4**. IrDA Sending/Receiving Unit **132** provides infrared sending and receiving means to receiver **100**. ICC interface unit **130** of FIGURE **4**, shown also in FIGURE **1**, is attached to the electronic user interface **400** for card insertions to transfer digital signatures to receiver **100**. Also comprising electronic user interface **400** is a Locate button **420** having the means of graphically interpolating a display of directions and geographical locations from GPS interface unit **128** (shown in Figure **1** and Figure **4**) and a digital signature containing geographical coordinates. Further comprising electronic user interface **400** is Priority button **410** for allowing a user to select an interrupt-priority value for a selected digital signature. Still further comprising the electronic user interface **400** is a BOBBY scan button **470** enabling activation of scanner **152** to scan multiple frequencies for a subsequent transmission instance of digital signature **200**. At least a first captured digital signature from the transmission instance of digital signature **200** is derived from activating Capture button **430** or as retrieved from IC Card **136** or from IrDA Sending/Receiving Unit **132** being communicatively coupled to infrared equipped device **138**. IrDA Sending/Receiving Unit **132** detects an infrared signal from infrared equipped device **138** for communicatively coupling receiver **100** with another infrared equipped device **138**. IrDA Sending/Receiving Unit **132** accepts transmitted conditional preferences as input from infrared equipped devices into

receiver **100**. ICC interface unit **130** detects an IC Card **136** (smart card) from insertion into ICC interface unit **130** for transferring digitally represented conditional preferences as input into receiver **100**.

In an audio centric embodiment example, a user while listening to receiver **100** upon hearing a preferred audio-video segment presses Capture button **430** to secure a first captured digital signature. A user would either accept the default interrupt-priority value or assign a different interrupt-priority value using Priority button **410** thus creating a conditional preference, i.e., an audio-video segment with an associated interrupt-priority value. Subsequently, BOBBY Scan Button **470** enables receiver **100** to scan frequencies and mediums to actively seek at a subsequent instance of the associated digital signature. Upon receiver **100** detecting a subsequent instance of digital signature **200** determines if the subsequent instance of digital signature **200** has a higher interrupt-priority value than the interrupt-priority value associated to the currently playing audio-video segment. If the transmission instance digital signature has the higher interrupt-priority value then tuner **164** is tuned to the frequency or Internet address of the transmission instance of digital signature **200** for playing by receiver **100**. Alternatively, the current audio-video segment is being played from internal playing component **176**, such as a CD-disk, DAT, cassette tape or MP3 file of receiver **100**. Internal playing component **176** plays the currently playing audio-video segment assigning the currently active digital signature with the associated interrupt-priority value. In this alternative embodiment, receiver **100** still actively seeks out

frequencies and mediums comprising a transmission instance of digital signature **200** to substitute the currently playing audio-video segment by internal playing component **176** with an audio-video segment having the higher interrupt-priority value.

In a video centric embodiment of the present invention, electronic user interface **400** captures a digital signature correlated to a video segment of the broadcast program. Electronic user interface **400** is not limited to audio correlation of digital signatures and can be applied to other receivers other than receiver **100**. Additional user interfaces for the management and manipulation of received digital signatures can be performed without departing from the scope of the invention.

Turning now to FIGURE **5**, illustrated is a flow diagram for the method of associating a captured digital signature to a conditional preference. The process starts at step **500** where memory initialization and clearing of registers occur for the capture of a digital signature, preferably receiver **100** resets for reception of the composite modulated/digital signal transmission. Next process step **510** reads the transmission instance of digital signature **200** (BOBBY), preferably being transmitted by transmitter **160** and subsequently received from Digital BOBBY Decoder **154**. Next process step **530** designates the transmission instance of digital signature **200** (BOBBY) as a currently active digital signature with a currently playing audio-video segment. Preferably, designated in onboard cache memory **146** and optionally displays on display unit **144** with an associated descriptive text. The process continues to decisional step **535** where a user, preferably by selecting Capture Button **430**, request

to capture the currently active digital signature creating at least a first captured digital signature having the correlated audio-video segment. If there is a request to capture the currently active digital signature (BOBBY), the process flows from **535** to where process step **565** determines authorization for at least the first captured digital signature (BOBBY). The currently active digital signature may be of a subscriber specific nature thus only allowing specific subscribers to capture and process the currently active digital signature. If a user does not have proper authorization the process continues to process step **555** where a user is notified of a failure to capture. Next the process continues to decisional step **520** where a determination is made on if to deactivate the process of associating captured digital signatures to conditional preferences. If a user deactivates the process of associating captured digital signatures to conditional preferences the process continues to termination step **570** where the process terminates. If there is not a request for deactivation then the process flow returns to process step **510**. Returning to decisional block **535** if there is no request to capture the currently active digital signature the process once again continues to decisional step **520**. Returning to decisional step **565**, upon valid authorization process step **550** next assigns the associated action for a conditional preference. It should be noted that multiple captured digital signatures could be associated to multiple conditional preferences. Next the process continues to step **525** where a conditional expression is defined for the conditional preference. Process step **525** further binds the conditional expression with the associated action to create a conditional preference associated to the captured digital signature, preferable a user

accessing keypad control unit **148** defines the conditional preferences for the captured digital signature. For example, using UTC for Play **258**, Audio Song Identifier **226**, and Channel to Play **252**, within the captured digital signature a user may request to be notified 15 seconds in advance on what channel a user can listen to a preferred song. Next the process continues to where step **560** stores the conditional preference into non-volatile memory **142**. Process step **560** allows a user to subsequently load the conditional preference for activation. The process continues once again to process step **510**.

Alternatively, digital signature **200** read in process step **510** is received from IrDA Sending/Receiving Unit **132** being communicatively coupled to infrared equipped device **138**. Alternatively, digital signature **200** read in process step **510** is received from IC Card **136** transference of digital signature **200** to ICC interface unit **130**. Alternatively digital signature **200** read in process step **510** can originate from internal playing component **176** such as a CD-disk player, DVD disk player, DAT player, computer disk drive, cassette tape or MP3 playing component. Alternatively a user can request to capture the currently active digital signature stores a reference of the correlated audio-video segment. Alternatively, a default action is in step **550** for the interrupt-priority value to be manually assigned using keypad control unit **148** or to automatically assign a default interrupt-priority value for the first captured digital signature. The default action of assigning an interrupt-priority value creates a conditional preference for automatically substituting a currently playing correlated audio-video segment with a correlated audio-video segment having a higher interrupt-priority

value. Alternatively, during process step **550** a user can assign a negative interrupt-priority value for the first captured digital signature. The negative value indicates that a user's preference is not to hear or view the correlated audio-video segment. The invention will automatically seek and search for an alternative audio-video segment upon tuner **164** receiving a correlated audio-video segment associated with a negative interrupt-priority value. For example, a user may detest a particular a song, thus the invention automatically seek and searches for other songs upon a detested song actively being played or upon broadcaster a preparing to broadcast the detested song. Alternatively process step **560** stores the conditional preference into IC Card **136** by transference of the conditional preference from ICC interface unit **130**. Alternatively process step **560** communicatively couples IrDA Sending/Receiving Unit **132** to infrared equipped device **138** for storing the conditional preference into infrared equipped device **138**.

Referring now to FIGURE **6-7** are process diagrams illustrating the method of processing conditional preferences for substituting a currently playing audio-video segment. Referring specifically to FIGURE **6** the process begins with start process **600** initializing scanner **152** and central processing unit **140**. Next the process continues to process step **605** where a user selects to activate a conditional preference, the conditional preference is a default conditional preference, but that need not be the case. The default conditional preference will initiate program instructions for seeking frequencies and/or Internet addresses transmitting a subsequent instance of a captured digital signature having a correlated audio-

video segment with a higher interrupt-priority value than the currently playing audio-video segment and automatically substituting the currently playing audio-video segment with the correlated audio-video segment having the higher interrupt-priority value. The default conditional preference contains at least a first captured instance of a digital signature for identifying the audio-video segment and an associated interrupt-priority value. Next process step **602** initializes and activates GPS interface unit **128**, ICC interface unit **130** and IrDA Sending/Receiving Unit **132**.

Next process step **610** reads at least one default conditional preference from ICC interface unit **130** if IC Card **136** is presently containing at least one default conditional preference. Next process step **615** reads at least one default conditional preference from IrDA Sending/Receiving Unit **132**, if IrDA Sending/Receiving Unit **132** detects infrared equipped device **138** communicative coupling to receiver **100**. Next process step **620** reads onboard cache memory **146**, if at least one default conditional preference is present in onboard cache memory **146**. Next process step **625** loads at least one default conditional preference for activation as was stored in process **560** of Figure **5**. Next during process step **635** identifies a current interrupt-priority value for the currently active digital signature associated with the currently playing audio-video segment, i.e. the current audio-video segment having an associated interrupt-priority value. If by happenstance, the currently active digital signature is also identified as a captured digital signature within a default conditional preference as loaded by process step **625** (i.e., a preferred audio-video segment is currently being played) then the

current interrupt-priority value is set to a value as loaded in process step **625**. If internal playing component **176** is active, i.e. the current audio-video segment is being played from internal playing component **176**, then process step **635** sets the current interrupt-priority value to a value as defined for the audio-video segment being played by internal playing component **176**. Next process step **640** assigns a current modulation mode, for example FM or AM. A default modulation mode can be user or system assigned. Next process step **645** sets a Start Frequency at which to start scanning multiple frequencies seeking a subsequent transmission instance of the captured digital signature as specified within the default conditional preference. Next step **650** scans a frequency range, preferably activating scanner **152** to scan the frequency range. Next decisional step **682** determines if there is a request to deactivate the processing of default conditional preferences. For example, selecting B-Scan button **470** again signals a request to deactivate the processing of conditional preferences. If there is a request to deactivate the processing of default conditional preferences then the process continues to termination step **690** where the process terminates. If there is not a request to deactivate processing of conditional preferences then decisional step **660** determines if the scanning of frequencies is at the end of the frequency range for the current modulation mode. If the scan frequency mode is at the end of the frequency range then the process continues where process step **655** selects a differing modulation mode. For example, receiver **100** may scan FM mode first then AM mode seeking subsequent transmission instances of captured digital signatures with associated conditional

preferences. After step **655** the process once again continues at step **645** where the Start Frequency range is set for a next modulation mode. Returning to decisional step **660** if frequency scanning is not at the end of the frequency range then decisional step **665** determines if a selected frequency has acceptable signal strength. If the selected frequency is unacceptable for reception of then the process once again continues frequency scanning at process step **650**. If the signal strength is acceptable the process continues from decisional step **665** to process step **670** attempts to read a transmission instance of a digital signature (BOBBY), preferable as decoded by Digital Bobby Decoder **154**. Next decisional step **675** determines if the transmission instance of digital signature **200** (BOBBY) is a subsequent transmission instance of a captured digital signature as specified within at least one default conditional preference. If the transmission instance of digital signature **200** is not subsequent transmission instance of a captured digital signature as specified within at least one default conditional preference then once again the process continues to process step **650**. Returning to decisional step **675**, if the transmission instance of digital signature **200** is a subsequent transmission instance of a captured digital signature for at least one default conditional preference then the process resumes at continuation step **A 685**.

Referring now to FIGURE **7**, continuation step **A 685** where the process continues to process step **710** where preferably an authorization key is compared on the subsequent transmission instance of the captured digital signature. Next the process continues where decisional step **715** determines authorization to receive the

subsequent transmission instance of the captured digital signature. If a user is not authorized to receive the subsequent transmission instance of the captured digital signature then the process continues to process step **725** which notifies a user of denied authorization. Next the process continues to continuation step **B 680**. Referring again to Figure **6**, continuation step **B 680** returns the process flow once again to decisional step **682**. Returning to Figure **7**, if decisional step **715** determines authorization is valid to process the subsequent transmission instance of the captured digital signature then the process flows to where decisional step **720** determines if interrupting the current audio-video segment is acceptable. Decisional step **720** compares the current interrupt-priority value to the interrupt-priority value specified in at least one default conditional preference specifying the capture transmission instance of digital signature **200**. It should be noted again that the current interrupt-priority value might have been derived from internal playing component **176** playing the current audio-video segment. If subsequent transmission instance of the captured digital signature as specified in the default conditional preference is less then or equal to the current interrupt-priority value, preferable stored in onboard cache memory **146**, then the process continues to process step **725** which notifies a user of the subsequent transmission instance of the captured digital signature. This allows, for example, a user to manually select tuner **164** to the specified frequency, if desired, to play the audio-video segment associated to the subsequent transmission instance of digital signature **200** even though the transmission instance is of lower interrupt-priority value. Next the

process once again continues to step **B 680.**

Returning to decisional step **720** if the subsequent transmission instance of digital signature **200** has a higher interrupt-priority value than the currently active digital signature, then process step **720** resolves the default conditional preference to a logically true state and alerts a user of an imminent substitution of the currently playing audio-video segment, thus permitting a manual override to avoid substitution of the currently playing audio-video segment. A default condition permits automatic substitution if a user does not respond by a specified time period. If a user does not manually override then the process continues to process step **730** which sets preferable tuner **164** to the modulation mode for the audio-video segment associated to the subsequent transmission instance of digital signature **200.** Next the process continues to process step **735** where preferable tuner **164** is reassigned to the frequency of the subsequent transmission instance of the captured digital signature, for playing the associated audio-video segment. Next the process continues to step **740** where receiver specific attributes, such as volume, bass and treble are adjusted to the specified values as defined in field **250.** This allows for specific songs to be played at specific volumes, bass, treble etc. through specific speakers. Next the process continues to step **745** where the transmission instance of the captured digital signature is specified as the currently active digital signature. Next the process once again continues to continuation step B **680.**

Alternatively, process step **640** sequences a multiplicity of Internet addresses for seeking the transmission instance of the

captured digital signature. Wherein process step **640** sequences a multiplicity of Internet addresses, process step **650** scans the multiplicity of Internet addresses and process step **655** starts rescanning the multiplicity of Internet addresses. Alternatively, tuner **164** maintains a network connection, tuner **164** in processes step **735** selects the corresponding Internet address associated with the transmission instance of the captured digital and associated streaming data.

Referring now to FIGURES **8-9** are flow process diagrams illustrating automatic commercial, geographical and ancillary operations based on conditional preferences. Referring specifically to FIGURE **8** the process begins in start process **800** where initialization occurs and conditional preferences have been loaded for activation (process steps **600-625**). More specifically, start process **800** activates at least one conditional preference comprising of an active conditional expression and an associated action. Where multiple conditional preferences are desired for activation start process **800** loads and activates multiple conditional preferences. Next the process continues to decisional step **815** where the process determines if the active conditional expression has a time parameter and optionally to at least one transmission instance of digital signature **200**. If the active conditional expression requires timing information then the process continues to process step **820** where preferably timing clock **156** is accessed for reading of a current time. From process step **820** the process continues to decisional step **825**. Returning to decisional step **815** If the active conditional expression has no time parameter associated then the process

continues to decision step **825** where a determination is made on if the active conditional expression has a geographical base parameter within the conditional expression and optionally to at least one transmission instance of a digital signature. For example, a user may wish automatic substitution of an audio-video segment with directions when a user is within a 5-mile radius of a specific store as reference in the transmission instance of digital signature **200**. Thus the invention permits for Geographical Activated Event Advertising (GAEA), herein referred to as a GAEA system. If there is the geographical base parameter in the active conditional expression then the process continues to process step **830** where the processes receives geographical information from preferable from GPS receiver **134** via GPS interface unit **128**. Alternatively, geographical information can be received from triangulation of cellular cells for a cellular device. Next the process continues to decision step **835**. Returning to decision step **825** if no geographical base parameter exist then the process once again returns to decision step **835** where a determination is made on if a commerce parameter is associated to the active conditional expression and optionally to at least one transmission instance of a digital signature. For example, the active conditional expression may specify an item for sale as referenced in the transmitted digital signature that has a specific purchase price and acceptable credit rating for purchase of the item. If the commerce parameter exists then the process continues to process step **840**, which access data from preferably IC Card **136** to collect associated commerce information necessary to execute a commerce transaction. Next the process continues to process step **845** wherein the time parameter, the geographical base parameter, the commerce

parameter and optionally the transmission instance of a digital signature are resolved within the active conditional expression. Returning to decision step **835** if there is no commerce parameter associated to the active conditional expression then the process once again returns to step **845**. Next the process continues to decision step **850** where a determination is made on if the active conditional expression evaluates to a logically true state. If the conditional preference evaluates to a false state then the process continues once again returns to step **815**. It should be noted that a single conditional expression might contain a combination of time, geographical and commerce parameters, thus requiring multiple iterations as defined within Figure **8**. It should also be noted that the invention recognizes time, geographical, and commerce parameters as changing conditions, as well as newly received transmission instances of digital signature **200**, thus reevaluating the active conditional expression as conditions change. If the active conditional expression evaluates to true then the process continues to continuation step **C 860**.

Referring now to Figure **9**, where the process continues from step **C 860** to decision step **900** where a determination is made on if the active conditional expression evaluates to perform an exit action, for example to quit processing conditional preferences. If the resolution is to quit processing then the process continues to termination step **990** where the process terminates. Returning to decision step **900** if the active conditional expression is not evaluated to the exit action then process continues to determination step **915** which determines if the conditional preference requires a

user interface action, for example, displaying information on a Liquid Crystal Display or making an associated audio sound. If the user interface action is required then process step **920** executes the user interface action. Next the process continues to decision step **925**. Returning to decision step **915** if no user interface action is required then the process once again continues to decision step **925**, which determines if the conditional expression requires geographical information, and/or for GPS interface unit **128** to be accessed. For example, geographical coordinates within a transmission instance of a digital signature may need to be displayed by sending GPS codes to GPS receiver **134**. If the conditional preference requires GPS access then the process continues to where step **930** accesses GPS interface unit **128**. In one conditional preference of the invention, at least one transmission instance of digital signature **200** comprising geographical coordinates is interpolated with geographical information from GPS interface unit **128** to display directions on display unit **144**. In another conditional preference of the invention, at least one transmission instance of digital signature **200** comprising geographical coordinates is triangulated with geographical information from cellular cells.

Next the process continues to decision step **935**. Returning to decision step **925** if the active conditional expression does not need access to GPS interface unit **128** then the process continues once again to decision step **935** which determines if an infrared action is associated with the active conditional expression. If an infrared action is associated with the active conditional expression then the process continues to step **940** which performs the associated infrared

action via the IrDA Sending/Receiving Unit **132**. For example IrDA Sending/Receiving **132** may send infrared commands to infrared equipped device **138**, which can be a radio, television, PDA, or a cellular phone. The process continues from **940** to decision step **945**. Returning to decision step **935** if no infrared action is associated with the active conditional expression then the process once again continues to decision step **945** which determines if an ICC action is associated with the active conditional expression. For example, the conditional preference may request that data be save to IC Card **136**. If no ICC action is required the process continues to decision step **955**. Returning to decision step **945**, if an ICC action is associated to the active conditional expression then the process continues to step **950** where ICC interface unit **130** is accessed to collect or write data to or from IC Card **136** to execute an electronic commerce transaction. Next the process continues where decision step **955** determines if an external device (not shown) is associated with the active conditional expression. The external device connection can be through output **170** or **172** of FIGURE **1**. In the preferred embodiment the interface is a Universal Serial Bus (USB) interface (not shown), alternative interface embodiments includes a serial or parallel port interface, not shown, connected to receiver **100**. If no external action is required then the process continues to decisional step **980** where the active conditional expression is evaluated to a logical state of true or false. It should be noted that process step **820, 830, 940, 950, 960** permitted for collection of information from their respective devices to assist evaluating the logical state of the active conditional expression in decisional step **980**. For example, process

step **910** evaluates the active conditional expression requiring time information as received in process step **820** to determine if the logical state of the active conditional expression is true, essentially determining if it is time to perform the associated action for an internal or external device. If decisional step **980** determines the active conditional expression is false then the process continues to continuation step **D 870**.

Returning to decision step **955** if an external device action is associated with the active conditional expression the process continues to step **960** which access the external device with a specified set of commands as defined within the associated action. Next the process once again goes to decisional step **980**. If the logical state of the active conditional expression is true then the process continues to **910** where actions are executed as specified within the associated action of the conditional preference and optionally relating to a transmission instance of digital signature **200**. Once again the process continues to continuation step **D 870** which continues the process again on Figure **8** to determination step **815**.

Turning now to FIGURE **10** illustrating a block schematic diagram of an alternative embodiment of the invention comprising a distributed computer network as the transmission medium with a first computer **1000** functioning as the digital distributing device **160** and a second computer **1040** functioning as receiver **100**. First computer **1000** correlates at least one digital signature to a data stream, such as audio or video multicasting. First computer **1000** may exist as traditional server within a computer network such as the Internet.

First computer **1000** comprising of a Digital Correlator **1030** software component, performs a software application-processing equivalent of Digital Correlator **150** wherein synchronizing data casting of digital signature **200** to an audio-video segment duration of time, however the output is formatted and transmitted over the distributed computer network **1080**, preferably using a Real-Time Streaming Protocol (RTSP), however, RTP, SMRP and RTCP are applicable to the invention. Digital Correlator **1030** software component concurrently sends an audio-video source and digital signature **200** to a Streamer Module **1020**. The data is sent to a Network Interface Card (**NIC**) **1010** for transmission over the distributed computer network **1080**. Distributed computer network **1080** in addition to wire and optical mediums may consist of a satellite **1090** for transmitting the streaming audio, video, and digital signatures through network **1080**. At least one second computer **1040** having digital processing capability and a Network Interface Card **1050** for interfacing to the Computer Network **1080** decodes the data stream along with the set of digital signatures from the streaming audio or video source. Network Interface Card **1080** retrieves the data stream and digital signature **200** from the distributed computer network **1080** sending digital signature **200** to a programmable Central Processing Unit **1060** having means to secure a captured instance of digital signature **200** and associating the captured instance of digital signature **200** to at least one conditional preference. Central processing Unit **1060** has further instructions for detecting a subsequent instance of the captured digital signature for automatically executing the associated action of the conditional expression evaluating to true state.

Second computer **1040** has means for displaying a textual representation digital signature **200** having a correlated audio-video segment on video display **1095** and automatically selecting differing data streams being transmitted within the distributed computer network having a subsequent instance of the transmitted instance of digital signature **200** as described in FIGURES **3**, and **5-9** with other improvements as described in these FIGURES as well. Alternatively, Streamer Module **1020** stores digital signature **200** in a database for the audio-video segment duration of time. In this alternative embodiment, the first computer **1000** can access digital signature **200** over distributed computer network **1080** within the duration of the audio-video segment duration time, optionally the data base may maintain digital signature **200** for a time longer than the audio-video segment duration of time due to network access and delayed timing characteristics. Alternatively, digital signature **200** may be streamed on separate channel than the audio-video source.